

TITLE OF THE INVENTION

CONTROL OF LCD DISPLAY BACKLIGHT BY ACTUATION OF A LATCH IN A NOTEBOOK COMPUTER

CLAIM OF PRIORITY

[0001] This application makes reference to, incorporates the same herein, and claims all benefits accruing under 35 U.S.C. §119 from an application for *NOTEBOOK COMPUTER* earlier filed in the Korean Industrial Property Office on July 13, 2001 and there duly assigned Serial No. 2001-42323.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates in general to a portable computer system, and more particularly, to a portable computer system improved in a structure of an LCD switch controlling power supplied to an LCD back light.

Description of the Related Art

[0003] Generally, a portable computer system such as a notebook main body is small and light and thus handy to carry, but on the other hand it cannot be used outdoors in the case that electric power is not supplied when a battery is exhausted. Therefore, in order to prolong the duration of a battery, technologies minimizing electric power consumption have been continuously developed by a

1 portable computer system manufacturer. In the portable computer system, electric power
2 consumption is relatively high at an LCD (Liquid Crystal Display) back light which scans an LCD
3 panel so as to display a picture. Therefore, if the electric power consumption required to display a
4 picture at the LCD panel is minimized, the duration of the battery may be effectively prolonged.

5 [0004] However, in these portable computer systems, it is possible to control electric power
6 supplied to an LCD back light only when an LCD assembly is opened and closed. Thus, there is a
7 shortcoming that it is impossible to control electric power supplied to the LCD back light, in the state
8 that the LCD assembly is opened. To make up for the shortcoming, a portable computer system
9 which can be controlled through a keyboard has been developed, but this main body makes another
10 shortcoming that it requires a separate switching control process as software.

11 [0005] Further, in the case that electric power supplied to the LCD back light is controlled through
12 the LCD switch, it requires that a push switch, and a pushing projection or a hook for pushing the
13 push switch should be separately provided at the main body and the LCD assembly, respectively.
14 Therefore, a structure thereof becomes complicated, and the cost of production becomes increased.
15 Moreover, when a design of the main body or the LCD assembly is changed, it requires additional
16 time and efforts because a design of the push switch must be changed together with the pushing
17 projection or the hook.

18 SUMMARY OF THE INVENTION

19 [0006] It is therefore an object of the present invention to provide an improved power control for
20 an LCD panel in a notebook computer.

1 [0007] It is also an object to provide a simple power control in a notebook computer enabling a
2 user at will to turn on or turn off power delivered to a back light of the LCD panel.

3 [0008] It is further an object to provide power control for a LCD display in a notebook computer
4 that doesn't require extra hardware or software and is inconspicuous.

5 [0009] It is yet another object of the present invention to provide power control of an LCD
6 monitor through a present and previous position of a slidable latch part that is used to lock the LCD
7 display onto the main body containing a keyboard.

8 [0010] It is further an object of the present invention to provide a simple mechanism that allows
9 a user to control power delivery to an LCD when the LCD panel is open, interrupt power
10 automatically when the LCD panel is closed, and to manually lock or fasten the LCD panel to the
11 main body when the LCD panel is closed.

12 [0011] These and other objects of the present invention may be accomplished by the provision of
13 a portable computer system having a main body, and an LCD assembly rotatably combined to the
14 main body and opening and closing onto the main body, and including an LCD panel displaying a
15 picture thereon and an LCD back light transmitting light for displaying the picture on the LCD panel
16 by power supply, the LCD assembly further includes a latch hole provided at one of the main body
17 and the LCD assembly, a latch member installed in the latch accommodating part provided at the
18 other one of the main body and the LCD assembly, and reciprocating from a hooking position at
19 which the latch member is hooked to the latch hole to a releasing position at which the latch member
20 is released from the latch hole, and an LCD switching part installed in the latch accommodating part
21 and controlling electric power supplied to the LCD back light according to the position of the latch

1 member. Preferably, the latch member is movable from the releasing position to a predetermined
2 extension position via the hooking position. Effectively, the LCD switch part cut off the electric
3 power where the latch member is positioned at the hooking position or the extending position.

4 [0012] Preferably, the LCD switch part includes a pushing projection provided at the latch
5 member, and a multistage push switch controlling the electric power by means of the pushing
6 projection where the latch member is positioned at the hooking position or the extension position,
7 and pushed or released where the latch member is positioned at the extension position passing
8 through the hooking position. Effectively, in the latch accommodating part is provided a spring
9 elastically pulling the latch member toward a hooking direction. Preferably, the latch hole is
10 provided at the main body, and the latch accommodating part is provided at the LCD assembly. On
11 the other hand, the latch hole may be provided at the LCD assembly, and the latch accommodating
12 part may be provided at the main body.

BRIEF DESCRIPTION OF THE DRAWINGS

14 [0013] A more complete appreciation of the invention, and many of the attendant advantages
15 thereof, will be readily apparent as the same becomes better understood by reference to the following
16 detailed description when considered in conjunction with the accompanying drawings in which like
17 reference symbols indicate the same or similar components, wherein:

18 [0014] Fig. 1 is a perspective view of a portable computer system;

19 [0015] Fig. 2 is a sectional view of a part in which a latch member is installed, in another portable
20 computer system.

1 [0016] Fig. 3 is a perspective view of a portable computer system according to the present
2 invention;

3 [0017] Fig. 4 is an exploded perspective view of a part in which latch and LCD switch parts are
4 installed in the portable computer system of Fig. 3;

5 [0018] Figs. 5 through 7 are sectional views of a combination of the latch and LCD switch parts
6 for explaining operations thereof; and

7 [0019] Fig. 8 is a table describing all four states of latch member and the effect each state has on
8 the backlight of the LCD.

DETAILED DESCRIPTION OF THE INVENTION

9 [0020] Turning to the figures, Fig. 1 is a perspective view of a portable computer system. As
10 shown therein, the portable computer system 101 has a main body 110 and a foldaway LCD
11 assembly 120 combined to the main body 110 by means of a hinge 155. Inside the main body 110
12 are installed a main board, a CPU, a RAM, etc., and on the upper side of the main body 110 are
13 provided a keyboard 113 and a touch pad 111 for an input operation. At the front edge of the upper
14 side of the main body 110 is provided a latch hole 115 corresponding to a latch member 133 (to be
15 described later) of the LCD assembly 120.

16 [0021] The LCD assembly 120 includes an LCD casing 121, an LCD panel 123 accommodated
17 in the LCD casing 121, and an LCD back light (not shown) installed at the rear of the LCD panel
18 123. At the free end of the LCD assembly 120 are provided the latch member 133 to be hooked and
19 unhooked to the latch hole 115 when the LCD assembly 120 contacts the upper side of the main
20

1 body 110, and a knob 143 for moving the latch member 133. The LCD panel 123 receives a video
2 signal from the main body 110, and displays it on the front surface thereof. The LCD back light (not
3 shown) transmits a plane light to the LCD panel 123 so as to display a picture on the LCD panel 123.

4 [0022] Further, at the main body 110 and the LCD assembly 120 is provided an LCD switch 150
5 cutting off electric power supplied to the LCD back light (not shown) when the LCD assembly 120
6 is closed in the state that the main body 110 is turned on. The LCD switch 150 includes a push
7 switch 153 provided on the upper side of the main body 110 at a position adjacent to the hinge 155
8 of the LCD casing 121, and a pushing projection 151 provided on the LCD assembly 120 at a
9 position corresponding to the position of the push switch 153.

10 [0023] With this configuration, if a user closes the LCD assembly 120 while using the portable
11 computer system 101, the electric power supplied to the LCD back light (not shown) is cut off
12 according as the pushing projection 151 pushes the push switch 153, thereby turning off the LCD
13 panel 123. Thereafter, if a user opens the LCD assembly 120, the electric power is supplied to the
14 LCD back light (not shown) according as the pushing projection 151 does not push the push switch
15 153. Thus, if a user closes the LCD assembly 120 while using the portable computer system 101, the
16 LCD panel 123 requiring relatively high electric power consumption is turned off with the main body
17 110 being turned on, thereby minimizing the electric power consumption of the battery.

18 [0024] Fig. 2 is a sectional view of a part in which a latch member 233 is installed, in another
19 portable computer system. In the portable computer system shown therein, an LCD switch 250 which
20 controls electric power supplied to an LCD back light (not shown) transmitting a light to an LCD
21 panel (not shown) includes a push switch 253 provided inside a latch hole 215, and a hook 251 of

1 a latch member 233 provided at an LCD assembly 220.

2 [0025] With this configuration, if a user closes the LCD assembly 220 while using the portable
3 computer system, the push switch 253 provided inside the latch hole 215 is pushed and electric
4 power supplied to the LCD back light (not shown) is cut off the moment the hook 251 of the latch
5 member 233 is hooked to the latch hole 215, thereby turning off the LCD panel (not shown).
6 Thereafter, if a user opens the LCD assembly 220, the latch member 233 does not push the push
7 switch 253, thereby supplying electric power to the LCD back light (not shown).

8 [0026] Fig. 3 is a perspective view of a portable computer system according to the present
9 invention. As shown therein, the portable computer system 1 comprises a main body 10 and a
10 foldaway LCD assembly 20 combined to the main body 10 by means of a hinge 55. Inside the main
11 body 10 are installed a main board, a CPU, a RAM, etc., and on the upper side of the main body 10
12 are provided a keyboard 13 and a touch pad 11 for an input operation. At the front edge of the upper
13 side of the main body 10 is provided a latch hole 15 corresponding to a hook 45 of the LCD
14 assembly 20.

15 [0027] The LCD assembly 20 includes an LCD casing 21, an LCD panel 23 accommodated in the
16 LCD casing 21, and an LCD back light (not shown) installed at the rear of the LCD panel 23. The
17 LCD casing 21 is comprised of a front casing 27 and a rear casing 29, which are mutually combined
18 so as to form a space for accommodating the LCD panel 23 and the LCD back light (not shown). The
19 LCD panel 23 receives a video signal from the main body 10, and displays it on the front surface
20 thereof. The LCD back light (not shown) transmits a plane light to the LCD panel 23 so as to display
21 a picture on the LCD panel 23.

1 **[0028]** As shown in Fig. 4, at the free end of the LCD assembly 20 are provided a latch part 30
2 to be hooked and unhooked to the latch hole 15 provided at the main body 10 when the LCD
3 assembly 20 is opened and closed, and an LCD switch part 50 (see Fig. 3) controlling electric power
4 supplied to the LCD back light (not shown) transmitting a plane light to the LCD panel 23.

5 **[0029]** Fig. 4 is an exploded perspective view of a part in which the latch part 30 and the LCD
6 switch part 50 are installed. As shown therein, the latch part 30 includes a latch accommodating part
7 31 provided at the middle of the free end of the LCD casing 21, a latch member 33 movably
8 accommodated in the latch accommodating part 31 and hooked and unhooked to the latch hole 15
9 with a reciprocating movement, a spring 35 elastically pulling the latch member 33 toward a hooking
10 direction, and a latch cover 37 covering the latch accommodating part 31. The latch accommodating
11 part 31 is a recess with a predetermined length along the center of the distal edge of the LCD casing
12 21. At one end of the latch accommodating part 31 is provided a first ring 41 to which one end of
13 the spring 35 is combined. The latch member 33 includes a knob 43 exposed out of the latch cover
14 37, and a hook 45 attached to knob 43 capable of being hooked and unhooked to the latch hole 15.
15 At one end of the latch member 33 is provided a second ring 47 (see Fig. 5) to which the other end
16 of the spring 35 is combined.

17 **[0030]** On the latch cover 37 are formed an elongated guiding hole 48 guiding the latch member
18 33 for the reciprocating movement, and an elongated hook hole 49 through which the hook 45
19 passes. The guiding hole 48 and the hook hole 49 have such lengths that the latch member 33 can
20 reciprocally move from a releasing position "A" (see Fig. 5), at which the hook 45 is positioned at
21 one end of the latch cover 37, to an extension position "C" (see Fig. 7), at which the hook 45 is

1 positioned at the other end of the latch cover 37, via a hooking position "B" (see Fig. 6), at which
2 the hook 45 is hooked to the latch hole 15 in a middle of a distal portion of main body 10 when the
3 LCD assembly 20 is closed.

4 [0031] While the LCD assembly 20 is opened, the latch member 33 is positioned at the releasing
5 position "A" (see Fig. 5) by a restoring force of the biased spring 35. If a user closes the LCD
6 assembly 20, the hook 45 of the latch member 33 is hooked to the latch hole 15 by the restoring force
7 of the spring 35 at the hooking position "B" (see Fig. 6). Further, the latch member 33 is moved to
8 the extension position "C" (see Fig. 7) accordingly as a user moves the knob 43 to a releasing
9 direction in order to open the LCD assembly 20, and then is restored to the releasing position "A"
10 by the restoring force of the spring 35 accordingly as a user lets go of the knob 43 after the LCD
11 assembly 20 is opened. The LCD switch part 50 is includes a pushing projection 51 attached to latch
12 member 33, and a push switch 53 provided at an opposite end of latch accommodating part 31
13 opposite first ring 41. The pushing projection 51 is protruded from the latch member 33 with a
14 predetermined length. The pushing projection 51 actuates push switch 53 when the latch member
15 33 is positioned at the hooking position "B" (see Fig. 6) or the extension position "C" (see Fig. 7)
16 or "D" (see Fig. 6) (see also Fig. 8).

17 [0032] The push switch 53 is comprised of a multistage push switch which can control electric
18 power supplied to the LCD back light (not shown) by stages according to the degree of actuation by
19 the pushing projection 51, *i.e.*, whether the latch member 33 is positioned at releasing position "A"
20 (see Fig. 5), hooking position "B" (see Fig. 6) an extension position "C" (see Fig. 7) or a position
21 "D" between "B" and "C" (see Figs 6 and 8). Here, where the latch member 33 is positioned at the

1 extension position "C", the push switch 53 is in a fully pushed state. The pushed push switch 53 is
2 partially released at a predetermined position, including a position "D" (see Fig. 6), namely, between
3 the hooking position "B" and the extension position "C", in order to turn on the LCD panel 23
4 whenever the LCD assembly 20 is opened.

5 [0033] With this configuration, in the portable computer system 1 according to the present
6 invention, if a user closes the LCD assembly 20 while using the portable computer system 1, as
7 shown in Fig. 6, the pushing projection 51 provided at the latch member 33 pushes the push switch
8 53 according as the latch member 33 is positioned at the hooking position "B", to thereby cut off
9 electric power supplied to the LCD back light (not shown). Thereafter, if a user opens the LCD
10 assembly 20, as shown in Fig. 5, the pushed push switch 53 is released according as the latch
11 member 33 moves to the releasing position "A", to thereby turn on the LCD panel 23 by supplying
12 electric power to the LCD back light (not shown).

13 [0034] Not only does extension position "C" serve to turn off the backlight of the LCD monitor,
14 extension position "C" serves as a toggle switch to determine whether the backlight of the LCD
15 monitor shall remain "off" or turn "on" when latch member 33 is subsequently moved to releasing
16 position "A". For example, if a user wants to turn off the LCD back light (not shown), with the LCD
17 assembly 20 being opened, a user has only to move the latch member 33 to the extension position
18 "C" (see Fig. 7). Then, the pushing projection 51 entirely pushes the push switch 53, and the electric
19 power supplied to the LCD back light (not shown) is cut off, so that the LCD panel 23 is turned off.
20 At this time, if a user lets go off the knob 43, though the latch member 33 is restored to the releasing
21 position "A" (see Fig. 5) by the restoring force of the spring 35, the push switch 53 remains in the

1 pushed state.

2 [0035] Thereafter, if a user wants to turn on the LCD back light (not shown) so as to allow the
3 LCD panel 23 to display a picture thereon, a user has only to move the latch member 33 to the
4 extension position "C" (see Fig. 7) again. Then, the pushing projection 51 pushes the push switch
5 53 again, to thereby release the pushed state of the push switch 53. Therefore, electric power is
6 supplied to the LCD back light (not shown) and the LCD panel 23 can display a picture. At this time,
7 if a user lets go off the knob 43, the latch member 33 is restored to the releasing position "A" (see
8 Fig. 5) by the restoring force of the spring 35 and the push switch 53 is released from the pushed
9 state.

10 [0036] As described above, the LCD switch part controlling electric power supplied to the LCD
11 back light is provided in the latch accommodating part, and therefore the LCD back light can be
12 simply turned on and off without a separate switching control process as software, with the LCD
13 assembly being opened.

14 [0037] Further, the LCD switch part, together with the latch member, is installed in the latch
15 accommodating part provided at the main body or the LCD assembly, and therefore there is no need
16 to change the design of one of the main body and the LCD assembly when the design of the other
17 one of them is changed.

18 [0038] In the above description, a latch hole is provided at a main body, and a latch
19 accommodating part accommodating a latch member together with an LCD switch part is provided
20 at an LCD assembly. However, the latch hole and the latch accommodating part may be respectively
21 provided at the LCD assembly and the main body.

1 **[0039]** As described above, the present invention provides a portable computer system in which
2 electric power supplied to an LCD back light can be controlled by a user as necessary without a
3 separate switching control process as software, with an LCD assembly being opened, and thus the
4 cost of production can be decreased according to the simplified structure.

5 **[0040]** Although the preferred embodiments of the present invention have been disclosed for
6 illustrative purpose, those skilled in the art will appreciate that various modifications, additions and
7 substitutions are possible, without departing from the scope and spirit of the invention as disclosed
8 in the accompanying claims.